The Common Alerting Protocol (CAP) Standard: Worldwide Applications

Presented 19 May 2011 in Venice, Italy by
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for the 2nd International Conference on Interoperability

The Citizen at the centre ...
Integration of Rescue Services

Today's Public Warning Patchwork

Every government has various public warning systems:

- Weather by news wire, fax, radio, television, e-mail, SMS text on cell phones ...
- Earthquakes/tsunami by e-mail, news wire, Web sites, pagers, telephone calls ...
- Fire, Security, Transportation by television, radio, sirens, police with bullhorns...
- > And on, and on ...

New Strategy for Public Warning

- Governments are realizing it makes no sense to build separate public warning systems for each particular type of emergency and for each particular communications medium
- Instead, efficiency and effectiveness argue for addressing public warning requirements with all-media coverage across all-hazards through interoperability standards

19/05/2011

Interoperability

Definition:

differences among systems are not a barrier to a task that spans those systems



"What few things must be the same so that everything else can be different"

What is CAP?

Common Alerting Protocol (CAP), ITU-T Recommendation X.1303, is a standard message format designed for All-Media, All-Hazard, communications:

- over any and all media (television, radio, telephone, fax, highway signs, e-mail, Web sites, RSS "Blogs", ...)
- ◆ about any and all kinds of hazard
 (Weather, Fires, Earthquakes, Volcanoes, Landslides, Disease Outbreaks, Air Quality Warnings, Transportation Problems, Power Outages ...)
- to anyone: the public at large; designated groups (civic authority, responders, etc.); specific people

```
<?xml version = "1.0" encoding = "UTF-8"?>
<alert xmlns = "urn:oasis:names:tc:emergency:cap:1.1">
 <identifier>KSTO1055887203</identifier>
 <sender>KSTO@NWS.NOAA.GOV</sender>
 <sent>2003-06-17T14:57:00-07:00</sent>
 <status>Actual</status>
 <msgType>Alert</msgType>
 <scope>Public</scope>
 <info>
   <category>Met</category>
   <event>Severe Thunderstorm</event>
   <responseType>Shelter</responseType>
   <urgency>Immediate</urgency>
   <severity>Severe</severity>
   <certainty>Observed</certainty>
  <senderName>National Weather Service Sacramento CA</senderName>
   <headline>Severe Thunderstorm Warning</headline>
   <description>Radar indicated a severe thunderstorm over Alpine County...
   moving southwest at 5 mph. Hail...intense rain and strong damaging winds
   are likely with this storm.</description>
   <instruction>take cover in a substantial shelter until the storm
   passes.</instruction>
  <area>
    <areaDesc>extreme north central Tuolumne County in California,
     extreme northeastern Calaveras County in California, southwestern
     Alpine County in California</areaDesc>
    <polygon>38.47,-120.14 38.34,-119.95 38.52,-119.74
     38.62,-119.89 38.47,-120.14
  </area>
 </info>
</alert>
```

19/05/2011

Presentation Outline

- Example tool for creating alerts in CAP format
- Key features of CAP message
- Notes on CAP Implementations
- Register of Alerting Authorities

Editing Tool for Alerts in CAP Format

Draft Only 20070815185348.xml Flash flood Warning for South Central San Bernardino, Western Riverside, and North Central San Diego Counties in Southwest California

Draft Only 20110125045333.xml Geomagnetic Storm Alert

Draft Only 20110125050647.xml Mount St Helens Volcano Advisory (aviation color code ORANGE)

Draft Only 20110205030309.xml Magnitude 7.8 Rat Islands, Aleutian Islands, Alaska

As Posted 20110202083709.xml Geomagnetic Storm Alert

As Posted 20110202100830.xml Flash flood Warning for South Central San Bernardino, Western Riverside, and North Central San Diego Counties in Southwest California

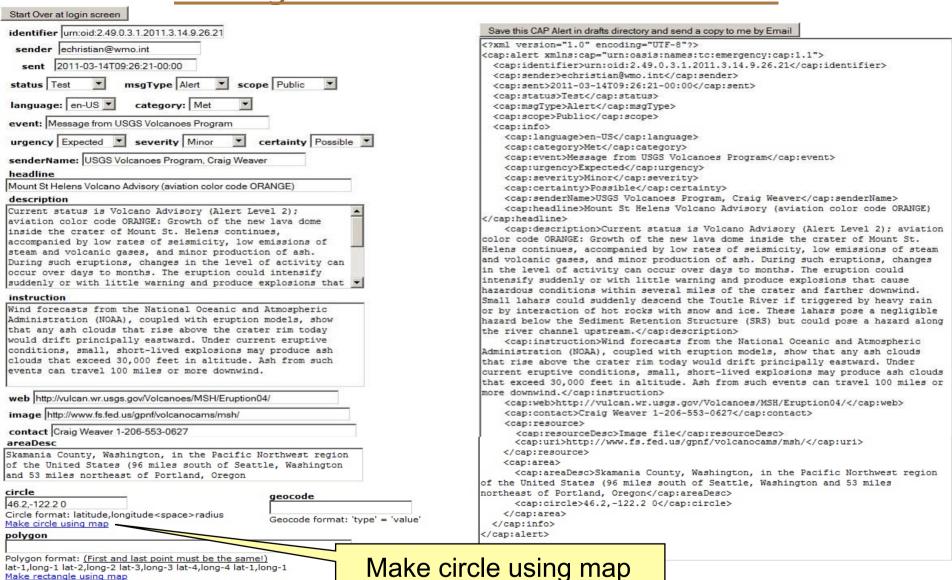
As Posted 20110205025759.xml Mount St Helens Volcano Advisory (aviation color code ORANGE)

Description: Current status is Volcano Advisory (Alert Level 2); aviation color code ORANGE: Growth of the new lava dome inside the crater of Mount St. Helens continues, accompanied by low rates of seismicity, low emissions of steam and volcanic gases, and minor production of ash. During such eruptions, changes in the level of activity can occur over days to months. The eruption could intensify suddenly or with little warning and produce explosions that cause hazardous conditions within several miles of the crater and farther downwind. Small lahars could suddenly descend the Toutle River if triggered by heavy rain or by interaction of hot rocks with snow and ice. These lahars pose a negligible hazard below the Sediment Retention Structure (SRS) but could pose a hazard along the river channel upstream.

Instruction: Wind forecasts from the National Oceanic and Atmospheric Administration (NOAA), coupled with eruption models, show that any ash clouds that rise above the crater rim today would drift principally eastward. Under current eruptive conditions, small, short-lived explosions may produce ash clouds that exceed 30,000 feet in altitude. Ash from such events can travel 100 miles or more downwind.

As Posted 20110205030309.xml Magnitude 7.8 Rat Islands, Aleutian Islands, Alaska

Editing Tool for Alerts in CAP Format



Make rectangle using map

circle

46.225,-120.921 99.55

Circle format: latitude,longitude<space>radius

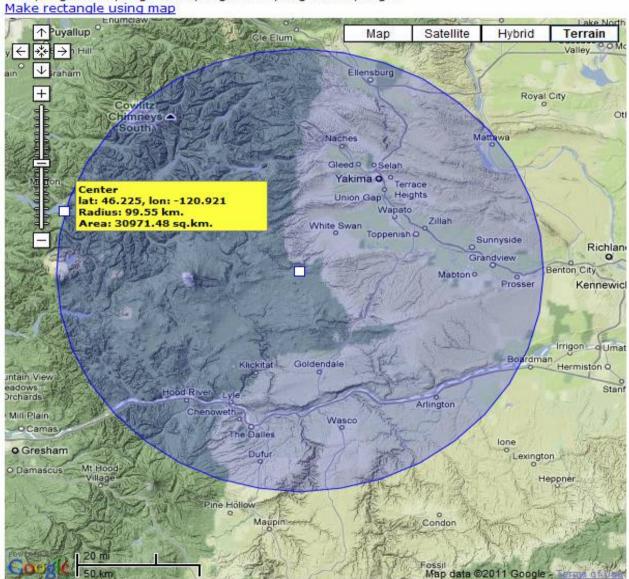
Make circle using map

geocode

Geocode format: 'type' = 'value'

polygon

Polygon format: (First and last point must be the same!) lat-1,long-1 lat-2,long-2 lat-3,long-3 lat-4,long-4 lat-1,long-1



Editing Tool for Alerts in CAP Format

Save this CAP Alert in drafts directory and send a copy to me by Email

Start Over at login screen

CAP message sent by e-mail to echristian@wmo.int

Publish this alert message to the RSS news feed?



Start Over at login screen

CAP alert saved to alerts directory as: 20110314092621.xml

RSS news feed for alerts has also been updated.

Return to alert message editing

RSS Feed for Alerts in CAP Format

```
<?xml version="1.0" encoding="UTF-8" ?>
- <rss version="2.0" xmlns:qeo="http://www.w3.org/2003/01/qeo/wqs84 pos#" xmlns:dc="http://purl.org/dc/elements/1.1/">
  - <channel>
     <title>Alerts Issued by ACMAD</title>
     dink>http://www.acmad.org/alerts/rss.xml</link>
     <description>Latest alerts posted by the African Centre of Meteorological Applications for Development
     <dc;publisher>ACMAD (African Centre of Meteorological Applications for Development)
     <language>en-us
     <copyright>public domain</copyright>
     <pubDate>Mon, 14 Mar 2011 10:37:11 +0000</pubDate>
     <lastBuildDate>Mon, 14 Mar 2011 10:37:11 +0000 
     <docs>http://blogs.law.harvard.edu/tech/rss</docs>
   - <image>
       <title>Latest Alerts posted by ACMAD</title>
       <url>http://www.acmad.org/images/acmad.gif</url>
       dink>http://www.acmad.org/alerts/rss.xml</link>
     </image>
   - <item>
       <title>Mount St Helens Volcano Advisory (aviation color code ORANGE)</title>
       <link>http://www.acmad.org/alerts/20110314092621.xml</link>
       <description>Current status is Volcano Advisory (Alert Level 2); aviation color code ORANGE: Growth of the new lava dome inside the crater of Mount St.
        Helens continues, accompanied by low rates of seismicity, low emissions of steam and volcanic gases, and minor production of ash. During such
        eruptions, changes in the level of activity can occur over days to months. The eruption could intensify suddenly or with little warning and produce
        explosions that cause hazardous conditions within several miles of the crater and farther downwind. Small lahars could suddenly descend the Toutle
        River if triggered by heavy rain or by interaction of hot rocks with snow and ice. These lahars pose a negligible hazard below the Sediment Retention
        Structure (SRS) but could pose a hazard along the river channel upstream.</description>
       <author>echristian@wmo.int</author>
       <category>Met</category>
       <guid>http://www.acmad.org/alerts/20110314092621.xml</guid>
       <pubDate>2011-03-14T09:26:21-00:00</pubDate>
     </item>
```

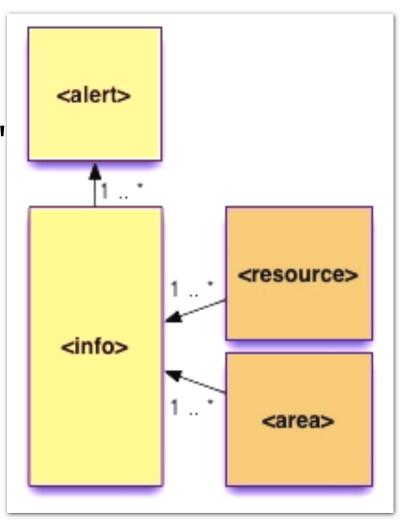
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Structure of a CAP Message

CAP Messages contain:

- Text values for human readers, such as "headline", "description" instruction", "area description", etc.
- Coded values useful for filtering, routing, and automated translation to human languages



Filtering and Routing Criteria

- Date/Time
- Geographic Area (polygon, circle, geographic codes)
- Status
 (Actual, Exercise, System, Test)
- Scope (Public, Restricted, Private)
- Type (Alert, Update, Cancel, Ack, Error)

Filtering and Routing Criteria

- Event Categories (Geo, Met, Safety, Security, Rescue, Fire, Health, Env, Transport, Infra, Other)
- Urgency: Timeframe for responsive action (Immediate, Expected, Future, Past, Unknown)
- > **Severity:** Level of threat to life or property (Extreme, Severe, Moderate, Minor, Unknown)
- Certainty: Probability of occurrence (Very Likely, Likely, Possible, Unlikely, Unknown)

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Typical CAP-based Alerting System Web Based OnAlert Multi-System Activation Options **Common Alerting Protocol** (CAP) Two Tone Activation System Common Alerting Protocol **Broadcast Community** (CAP) Network Two Tone Encoder Two Tone EAS EAS Encoder Activation System WARNING SYSTEMS, INC. Transmitter Network Posted by authorized personnel and/or system Retrieved by alert notification **Emergency Operations Center** Ethernet Local Area Network (LAN) **Remote Access** Local Access TAR DTMF Activation Activation Microphone System System Leased Remote Line Wide Area Network Microphone (WAN) Tone Tone Embedded Remote Ethernet Transmitter Network Transmitter Network **Backup EOC Primary EOC**

19/05/2011

Notes on CAP Implementations 2011

Based on the recent CAP Implementation Workshop

- CAP and Google Crisis Response
- CAP Support in ESRI's
 Open Source GeoPortal Server
- CAP in the United States



National Oceanic and Atmospheric Administration's

National Weather Service

Site Map News

Local forecast by "City, St"



Go

Sign-up for Email Alerts

XML RSS Feeds

Warnings Current

By State/County...

Observations

Radar Satellite Snow Cover Surface Weather... Observed Precip

Forecasts

Local
Graphical
Aviation
Marine
Hurricanes
Severe Weather
Space Weather
Fire Weather

Text Bulletins

By State By Message Type National

Forecast Models

Numerical Models
Statistical Models...
MOS Prod
GFS-LAMP Prod

Climate

Past Weather

NWS Public Alerts in XML/CAP v1.1 and ATOM Formats

Overview

Home >

This page provides access to NWS watches, warnings, advisories, and other similar products in the Common Alerting Protocol (CAP) and Atom Syndication Format (ATOM).

Use of ATOM and CAP with Traditional and Emerging Technologies

NWS CAP and ATOM feeds can be used to launch Internet messages, trigger alerting systems, feed mobile device (e.g., cell phone/smart phone and tablet) applications, news feeds, television text captions, highway sign messages, and synthesized voice over automated telephone calls or radio broadcasts.

CAP Overview

CAP is an XML-based information standard used to facilitate emergency information sharing and data exchange across local, state, tribal, national and non-governmental organizations of different professions that provide emergency response and management services. NWS CAP messages are produced in the CAP v1.1 format defined by the Organization for the Advancement of Structured Information Standards (OASIS).

Developers and re-packagers of NWS CAP messages should review the Technical Notes about the NWS CAP 1.1 Messages.

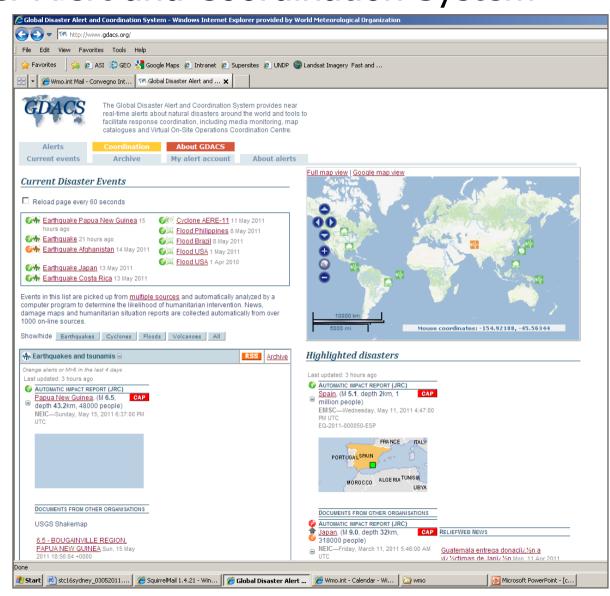
ATOM Overview

ATOM is an XML based document format for syndicating news and other timely news-like information. The NWS ATOM feeds act as an index for active CAP messages by state, county, and NWS forecast zones to aid the automated dissemination of this information.

ATOM provides headlines, URLs to the source document and brief description information in an easy to understand and use format. Software libraries exist to read the ATOM format and present ATOM headlines on webpages, personal computer workstations, and mobile devices. For consumers of these feeds as indexes to the CAP messages, the ATOM feeds contain several CAP data fields to assist in the tracking of available CAP messages with the goal of reducing the need to guery the complete CAP message at every refresh.

Global Disaster Alert and Coordination System

GDACS is a Joint Initiative of the United Nations and the European Commission GDACS is collecting data and information from scientific and media sources in participation with European **Commission Joint** Research Centre. **UNOSAT** and OCHA ReliefWeb. Financially supported for 2008-2009 by EC MIC 19/05/2011



Notes on CAP Implementations 2011

- Satellite Alert Channel
- CAP worldwide over GTS
- CAP across Europe: MeteoAlarm
- CAP in Germany
- CAP in Sri Lanka and India

Meteoalarm.eu

Integrates all important severe weather information originating from the official National Public Weather Services across a large number of European countries.



Notes on CAP Implementations 2011

- CAP in South Africa
- CAP in Canada
- CAP Pilot System in China
- CAP for Disasters in Japan
- CAP in Australia

Notes on CAP Implementations 2011

- Caribbean CAP network
- CAP in New Zealand
- Severe Weather Forecasting **Demonstration Project**
- Others

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Register of Alerting Authorities

The Need for a Register

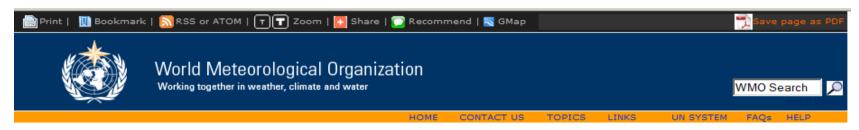
- Aggregators and other intermediaries may lack direct knowledge needed to distinguish an authoritative source of alert messages
- This lack becomes critical as alerting makes use of large public networks
- ➤ The WMO Register of Alerting Authorities is a reference to address that lack

Register of Alerting Authorities

- Developed for WMO Public Weather Services
- WMO Members can identify their officially recognized alerting authorities
- Each Register entry asserts that a particular source of alert messages is regarded by a WMO Member as authoritative for particular categories of hazards over a particular area
- Register includes URL's for forecasts and CAP messages
- Aggregators of alert messages and others can subscribe to a news feed to stay current with any changes to the register

Register of Alerting Authorities

http://www.wmo.int/alertingorg

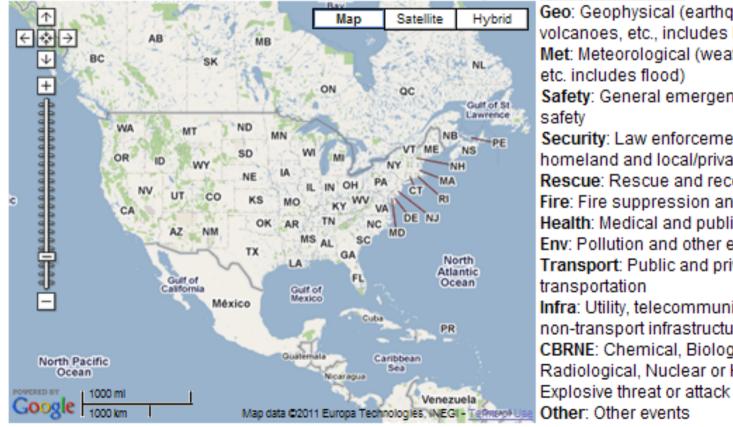


Public Weather Services established this register of information about alerting authorities as identified by Members. For questions, please contact us. This page is using nested navigation, but is available without frames as well. Select a country to get started.

Alerting authorities by WMO Member or Organization To monitor updates to this Register, subscribe to the RSS or ATOM news feed. Afghanistan C Antiqua and Barbuda Albania Algeria Angola Azerbaijan Argentina Armenia Australia Austria Bahamas C Bahrain C Bangladesh Barbados Belarus ○ Belaium C Bolivia Belize Benin Bhutan C Bosnia and Botswana O Brazil C Brunei Darussalam Bulgaria Herzegovina Canada C Burkina Faso Burundi Cambodia Cambodia Cameroon Chile Chile Chad. China. Cape Verde Central African Republic C Congo Colombia Comoros Cook Islands Costa Rica ○ Cuba Cote d'Ivoire Croatia C Cyprus Czech Republic C Democratic People's C Djibouti Denmark Dominica C Dominican Republic Republic of Korea Ecuador Egypt FI Salvador Fritrea Estonia Ethiopia ○ Fiji Finland France French Polynesia

OID: 2 49 0 0 840 0 WMO Member: United States of America ISO 3166: US USA 840. ISSUING Organization: National Oceanic and Atmospheric Administration Hazard Categories:
☐ Geo ☐ Met ☐ Safety ☐ Security ☐ Rescue ☐ Fire ☐ Health ☐ Env ☐ Transport ☐ Infra □ CBRNE □ Other Authorization Basis: The National Weather Service Organic Act of 1890, currently codified as amended in section 313 of title 15 of the federal statutory code (called the United States Code) authorizes the National CAP Feed URL: http://www.weather.gov/alerts/ Forecasts URL: http://www.worldweather.org/093/m093.htm Editor: echristian@wmo.int Submit changes Cancel changes

Set the map view of the typical area for this alerting authority.



Hazard Categories

Geo: Geophysical (earthquakes, volcanoes, etc., includes landslide) Met: Meteorological (weather, storms, etc. includes flood) Safety: General emergency and public safety Security: Law enforcement, military. homeland and local/private security Rescue: Rescue and recovery Fire: Fire suppression and rescue Health: Medical and public health Env: Pollution and other environmental. Transport: Public and private transportation Infra: Utility, telecommunication, other non-transport infrastructure CBRNE: Chemical, Biological, Radiological, Nuclear or High-Yield

RSS Feed for Changes in Registered Authorities

```
<rss version="2.0" xmlns:georss="http://www.georss.org/georss"</pre>
   xmlns:cap="urn:oasis:names:tc:emergency:cap:1.1">
- <channel>
       <title>World Meteorological Organization (WMO) Register of Alerting Authorities</title>
       link>http://www-db.wmo.int/alerting/rss.xml</link>
        <description>WMO maintains this register of statements by WMO Members concerning
          the scope of official alerting authorities and locations of online sources. </description>
       <language>en-us</language>
       <publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi><publi
       <lastBuildDate>Fri, 11 Mar 2011 13:14:14+01:00 GMT
        <docs>http://blogs.law.harvard.edu/tech/rss</docs>
       <managingEditor>echristian@usqs.gov</managingEditor>
       <webMaster>echristian@usqs.gov</webMaster>
   - <item>
           <title>United States of America: National Oceanic and Atmospheric
              Administration</title>
           <link>http://www-db.wmo.int/alerting/authorities.asp?recId=177</link>
           <description>A WMO Member [United States of America] identifies National Oceanic
              and Atmospheric Administration as an alerting authority for hazard threats of
              these CAP categories: Geo Met Fire Health Env CBRNE.</description>
           <pubDate>Fri, 11 Mar 2011 13:14:14+01:00 GMT</pubDate>
           <guid>urn:oid:2.49.0.0.840.0</guid>
           <author>echristian@wmo.int</author>
           <category domain="http://www.itu.int/rec/T-REC-X.1303/en">Geo</category>
           <category domain="http://www.itu.int/rec/T-REC-X.1303/en">Met</category>
           <category domain="http://www.itu.int/rec/T-REC-X.1303/en">Fire</category>
           <category domain="http://www.itu.int/rec/T-REC-X.1303/en">Health</category>
           <category domain="http://www.itu.int/rec/T-REC-X.1303/en">Env</category>
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           <cap:category>CBRNE</cap:category>
        </item>
```

Review of Key Points

- 1. Rationale for standards-based, all-hazards, all-media alerting
- 2. Key worldwide standard is ITU-T Recommendation X.1303, Common Alerting Protocol (CAP)
- 3. Importance of structure and coded values in contrast to free-text
- 4. Typical roles of WMO Members in all-hazards alerting
- 5. WMO register of Alerting Authorities

Questions?

Contact: Eliot Christian <echristian@wmo.int>

World Meteorological Organization

- WMO Congress (2007) requested the Secretary-General to improve the exchange of high priority data and products in support of a virtual all hazards network
- WMO Executive Council (2008) requested Commission for Basic Systems to follow up on CAP implementation as a matter of urgency
- WMO Executive Council (2009) asked the Secretariat, and invited all Members and Regional Associations, to spare no efforts in ensuring that the implementation of CAP benefits all user communities

ITU Resolution 136

"The Plenipotentiary Conference [...] resolves [...] to promote implementation by appropriate alerting authorities of the international content standard for all-media public warning, in concert with ongoing development of guidelines by all ITU Sectors for application to all disaster and emergency situations"

19/05/2011

U.S. Federal Communications Commission

"Washington, D.C. - The Federal Communications Commission today adopted [an Order that] requires [Emergency Alert System (EAS)] participants to accept messages using Common Alerting Protocol (CAP) [...] The use of CAP will help to ensure the efficient and rapid transmission of EAS alerts [...] in a variety of formats (including text, audio and video) and via different means (broadcast, cable, satellite, and other networks) [...] In addition, the Order expands the EAS system by requiring participation by wireline video providers."